



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,200	08/29/2001	Eugene P. Marsh	150.0064 0102	8194
26813	7590	10/29/2003	EXAMINER	
MUETING, RAASCH & GEBHARDT, P.A. P.O. BOX 581415 MINNEAPOLIS, MN 55458			NGUYEN, JOSEPH H	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 10/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,200

Applicant(s)

MARSH, EUGENE P.

Examiner

Joseph Nguyen

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

In view of the appeal brief filed on 8/18/2003, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dornfest at el. in view Smith et al.

Regarding claim 23, Dornfest at el. discloses on figure 2 a semiconductor device structure, the structure comprising a substrate assembly 31 including a surface; and a

Art Unit: 2815

chemical vapor deposited barrier layer 50 over at least portion of the surface, wherein the barrier layer 50 is formed of a platinum (X): ruthenium (1-X) alloy, where X is in the range of about 0.60 to 0.995 (col. 5, lines 15-28). Dornfest et al. does not expressly disclose that the barrier layer is substantially free of carbon. However, Smith et al. discloses forming such layer substantially free of carbon (col. 4, lines 25-29). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Dornfest et al. by having the barrier layer being substantially free of carbon for the purpose of eliminating the detrimental effects caused by carbon contamination of films (col. 1, lines 43-50).

Regarding claim 24, Dornfest et al. discloses on that X is in the range of about 0.90 to about 0.98 (col. 5, lines 25-27).

Regarding claim 26, Dornfest et al. discloses on figure 2 the portion of the surface is a silicon-containing surface.

Regarding claim 27, Dornfest et al. discloses on figure 2 a capacitor structure comprising a first electrode 38; a dielectric material 40 on at least a portion of the first electrode; and a second electrode 36 on the dielectric material, wherein at least one of the first and second electrode comprises a chemical vapor deposited barrier layer 50 of platinum (X): ruthenium (1-X) alloy, and further wherein the barrier layer is substantially free of carbon.

Regarding claim 28, Dornfest et al. discloses that X is in the range of about 0.60 to about 0.995 (col. 5, lines 15-28).

Art Unit: 2815

Regarding claim 29, Dornfest at el. discloses that X is in the range of about 0.90 to about 0.98 (col.5, lines 25-27).

Regarding claim 30, Dornfest at el. discloses on figure 2 at least one of the first electrode and second electrode comprises the barrier layer 50 of platinum (X): ruthenium (1-X) alloy and one or more additional conductive layers 48, 46, 44.

Regarding claim 31, Dornfest at el. discloses on figure 2 the one or more additional conductive layers 48, 46, 44 are formed from materials selected from the group of metals and metal alloys; metal and metal alloy oxide; metal nitrides and metal silicides.

Regarding claim 32, Dornfest at el. discloses on figure 2 a memory cell structure comprising a substrate assembly including at least one active device 31; and a capacitor formed relative to the at least one active device, the capacitor comprising at least one electrode 38 including a chemical vapor deposited barrier layer 50 formed of platinum (X): ruthenium (1-X) alloy, wherein the barrier layer is substantially free of carbon.

Regarding claim 33, Dornfest at el. discloses on figure 2 the capacitor includes a first electrode 38 formed relative to a silicon containing region of the at least one active device; a dielectric material 40 on at least a portion of the first electrode; and a second electrode 36 on the dielectric material, wherein the first electrode comprises the barrier layer 50 formed of platinum (X): ruthenium (1-X) alloy.

Regarding claim 34, Dornfest at el. discloses on figure 2 the first electrode 38 comprising the barrier layer 50 formed of platinum (X): ruthenium (1-X) alloy includes one or more additional conductive layers 48, 46, 44.

Regarding claim 35, Dornfest at el. discloses that X is in the range of about 0.60 to about 0.995 (col. 5, lines 15-28).

Regarding claim 36, Dornfest at el. discloses that X is in the range of about 0.90 to about 0.98

Regarding claim 37, Dornfest at el. discloses on figure 2 an integrated circuit structure comprising a substrate assembly 31 including at least one active device 31; and an interconnect 38 formed relative to the at least one active device, the interconnect including a barrier layer 50 formed of platinum (X): ruthenium (1-X) alloy.

Regarding claim 38, Dornfest at el. discloses that X is in the range of about 0.60 to about 0.995 (col. 5, lines 15-28).

Regarding claim 39, Dornfest at el. discloses that X is in the range of about 0.90 to about 0.98.

Regarding claim 40, Dornfest at el. discloses that the barrier layer 50 comprises a chemical vapor deposited barrier layer (col. 9, lines 43-44).

Regarding claim 41, Dornfest at el. discloses on figure 2 the at least a portion of the surface defines a small high aspect ratio opening.

Regarding claim 42, Dornfest at el. discloses that a thickness of the barrier layer 50 is in a range of about 10A to about 10,000A (col. 6, lines 5- 7).

Art Unit: 2815

Regarding claim 43, Dornfest at el. discloses that the thickness of the barrier layer is in a range of about 100A to about 500A (col. 6, lines 5-7).

Regarding claim 44, Dornfest at el. discloses on figure 2 the substrate assembly 31 comprises at least one active device.

Regarding claim 45, Dornfest at el. discloses that the barrier layer 50 comprises a chemical vapor deposited barrier layer (col. 9, lines 43-44).

Regarding claim 46, Dornfest at el. discloses on figure 2 the substrate assembly comprises a small high aspect ratio opening, and further wherein the interconnect is formed in the small high aspect ratio opening relative to the at least one active device.

Regarding claim 47, Dornfest at el. discloses that a thickness of the barrier layer 50 is in a range of about 10A to about 10,000A.

Regarding claim 48, Dornfest at el. discloses that the thickness of the barrier layer is in a range of about 100A to about 500A.

Regarding claims 25 and 49, Dornfest at el. and Smith et al. disclose substantially all the structure set forth in the claimed invention except X being about 0.95. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Dornfest at el. and Smith et al. by having X being about 0.95 for the purpose of improving the performance of the semiconductor device, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Art Unit: 2815


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (703) 308-1269. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 308-7382 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JN
October 27, 2003


GEORGE ECKERT
PRIMARY EXAMINER